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Comparison of Labor Productivity Perspectives of Project Managers and Craft Workers in Turkish Construction Industry

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Abstract

The success of a construction project mainly depends on the management of the highly correlated inputs like labor-force, materials and capital. Since labor-force varies from region to region, it contains many uncertainties. Therefore, among these inputs labor-force is the most difficult one to manage. In this sense, it is important to determine the factors affecting labor-productivity to manage labor-force effectively. In the literature there are many studies in which the factors were identified from the managers' perspectives. In this study, it was argued that craft workers have the biggest impact on labor productivity and hence, their opinion should also be considered during identifying these factors. According to this argument in this study it was aimed to compare labor productivity perspectives of managers and craft workers. In this context, a previously used questionnaire to evaluate construction managers' perspectives by Kazaz et.al [1] was applied to craft workers. The results revealed that, despite the difference of the priorities of managers and craft workers, the most influential factors that affect labor productivity were grouped under organizational factors.

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1. Introduction

Project management mainly focuses on optimizing the time, cost and quality of a project. Especially in construction industry which has a competitive environment, accomplishing a project in a short time with low cost and high quality became an important goal for project managers [2]. Although construction industry has made a significant progress by developing new methods, equipment and materials labor productivity still dominates the production [3]. The time and cost performance of a construction project mainly depends on the labor productivity [4, 5]. Especially, a reliable schedule can only be created by using real-like labor productivity values. Therefore, identifying the factors affecting labor productivity will ease time and cost management for project managers.

The topic “labor productivity” has attracted the interest of many researches and as a result many studies were conducted to identify the factors affecting labor productivity [6]. But in most of these studies the factors were evaluated by participants which had a managing position in a construction project. On the other side, craft workers are the basic components which determine the actual productivity value. In other words, craft workers can evaluate more accurate the factors affecting their productivity [7]. Therefore, project managers should also determine the differences and common grounds of craft workers’ perception in labor productivity to develop an effective management policy. In this study, a previously used questionnaire to evaluate construction managers’ perspectives used by Kazaz et.al [1] was applied to craft workers to compare labor productivity perspectives of managers and craft workers.

2. Literature Review

Labor productivity is simply defined as the amount of work done by craft workers within a certain period of time [5, 8]. On the other side, construction projects are conducted locally and hence, in every project working conditions and project participants changes from region to region [9]. Accordingly, labor productivity will also vary depending on the region where the project is executed. As a result, most of the studies in the literature were conducted for specific regions by considering managers’ perspective and different results were obtained.

In Table 1 some of these studies and their results are summarized. As seen in Table 1 the investigated countries are underdeveloped or developing regions. Therefore most of the factors are common independently of the region. There were also 2 studies encountered in the literature in which the workers’ labor productivity perspectives were evaluated (Table 2). Although the investigated countries have different development levels, in both countries lack of construction equipment was the most important factor affecting labor productivity. In addition, Dai et. al [7] also compared the labor productivity perspectives of craft workers and foremen. The research was conducted in US in which the same questionnaire was applied to craft workers and foremen separately. Although, foremen have a managing position in a construction project, they have a close relationship with craft workers in the construction sites. In other words, they work under similar conditions with craft workers. Therefore in this study both of the participant groups emphasized on similar factors which were lack of construction equipment, materials and tools, and engineering drawings [7]. Finally, Chan and Kaka [10] conducted a research in UK to compare the labor productivity perspectives of project managers and craft workers. Similar to other studies a questionnaire was applied to both of these participant groups. The results revealed that, control and quality requirements are the most important factors for project managers and craft workers, respectively. In this paper, a similar research to Chan and Kaka [10] was conducted for Turkey. For this purpose, via a questionnaire 37 factors grouped under 4 categories were evaluated by project managers and craft workers, and statistically analyzed.

Table 1. Managers’ perspective on labor productivity.

Country	Researchers	Year	Number of Investigated Factors	Most Important Factors Affecting Labor Productivity
Egypt	El-Gohary vd [11]	2014	30	labor experience and skills incentive programs availability of the material and ease of handling leadership and competency of construction management

				competency of labor supervision
Kuwait	Jarkas and Bitar [12]	2012	45	clarity of technical specifications the extent of variation coordination level among design disciplines.
India	Thomas and Sudhakumar[13]	2013	44	material unavailability
Palestine	Mahamid [5]	2013	31	rework lack of cooperation and communication between construction parties, financial status of owner lack of labor experience lack of materials.
Qatar	Jarkas vd [14]	2012	35	skill of labour shortage of materials labour supervision shortage of experienced labour communication between site management and labour force lack of construction managers' leadership high temperature weather delays in responding to "Requests For Information" lack of providing labour with transportation proportion of work subcontracted
Turkey	Kazaz vd [1]	2008	37	quality of site management material management on-time payment
Gazza Strip	Enhassi vd [15]	2007	45	material shortage lack of labor experience lack of labour surveillance misunderstandings between labour and superintendent drawings and specification alteration during execution.
Uganda	Alinaitwe vd [16]	2007	36	lack of material rework lack of craft worker skill

Table 2. Craft workers' perspective on labor productivity.

Country	Researchers	Year	Number of Investigated Factors	Most Important Factros Affecting Labor Productivity
USA	Dai vd [7]	2007	83	construction equipment
Chile	Rivas vd [17]	2011	38	lack of equipment, materials, tools

3. Methodology

To obtain the necessary data for the study a questionnaire consisting of two parts was prepared. In the first part, questions were asked to get demographic information about the participants. The second part was the same questionnaire which was prepared and used by Kazaz et. al [1] to evaluate labor productivity perspective of project managers. In this part 37 factors were grouped under 4 headings named as socio-psychological, economical, physical, and organizational factor groups. These factors were organized a 5-point Likert-scale where 1 and 5 represented "not

significant” and “extremely significant”, respectively. After the questionnaire was prepared, it was applied to 126 craft workers working in 4 different construction projects face to face. During the interviews necessary interventions were made and thus, all questionnaire results were used in the statistical analysis. In addition, the results of labor productivity perspectives of project managers were taken directly from the research conducted by Kazaz et. al [1].

The reliability of the questionnaire was tested by Test of Internal Consistency. The Cronbach’s Alpha Reliability Test Method is the common used method to evaluate the internal consistency. The Cronbach’s alpha coefficient ranges between 0 and 1, and it is accepted that values between 0.60 and 0.90 make the questionnaires reliable [18]. Similarly, Relative Importance Index (RII) method was used to calculate the average point of each factor. RII is a statistical method which determines more precisely the relative weight of each variable among total variables. Since the factors were organized on a 5-point Likert-scale, the numeral intervals shown in Table 3 were used to conduct statistical analysis.

Table 3. Numeral intervals of RII method.

Min RII points	Definition	Max RII points
1,00	not significant (NS)	1,80
1,80	somewhat significant (SS)	2,60
2,60	Significant (S)	3,40
3,40	very significant (VS)	4,20
4,20	extremely significant (ES)	5,00

4. Discussion of Results

The Cronbach’s Alpha Reliability Test Method was applied to each factor groups separately. The Cronbach’s alpha coefficient of socio-psychological, economical, physical and organizational factor groups were calculated as 0.670, 0.664, 0.788 and 0.646, respectively which were in the expected interval and made the questionnaire reliable. After the results of the questionnaire was evaluated with RII method, 9 of the factors were identified as “extremely significant” by the craft workers. On the other side, the research conducted by Kazaz et. al [1] revealed that only 7 factors were “extremely significant” in project managers’ perspective. In Table 4 results of the both surveys are shown comparatively.

Indeed, both of the survey results revealed the expectations of the participant groups from their work life. Namely, in construction industry craft workers are employed in a specific project for a certain period of time. Therefore, especially in developing countries like Turkey it is a common approach not to social insure all of the craft workers employed in a specific project. In addition, the education level of construction workers is low and accordingly, their wages are also low in Turkey. Finally, it is a common practice in Turkish construction industry not to pay all the wages on time to prevent walkout of the workers before their work ends. In this context, since in craft workers’ perspective the first 3 of the factors belong to economic factor group, it can be deduced that the expectations in these aspects are not exactly met. Similarly, although project managers are employed for a specific construction project, they are actually an employer of a construction company. Therefore, the performance of an accomplished project is important for the continuity of the work life or promotion within the company of a project manager. In this aspect, the main aim of project managers is to accomplish a project in a short time with low cost and high quality which requires a proper organizational structure. As seen in Table 4 the results of the research conducted by Kazaz et. al [1] supports this argument.

Table 4. Extremely significant factors identified in both of the studies.

Craft workers' perspective			Managers' perspective		
Rank	Name of Productivity Factor	Factor Group	Rank	Name of Productivity Factor	Factor Group
1	Working in social insurance	Economic	1	Quality of site management	Organizational
2	On-time payment	Economic	2	Material management	Organizational
3	Amount of pay	Economic	3	On-time payment	Economic
4	Dining hall-and-dorm conditions	Organizational	4	Systematic flow of work	Organizational
5	Health-and-safety conditions	Socio-psychological	5	Supervision	Organizational
6	Quality of site management	Organizational	6	Site layout	Organizational
7	Systematic flow of work	Organizational	7	Work discipline	Socio-psychological
8	Work discipline	Socio-psychological	8	-	-
9	Relaxation allowances	Organizational	9	-	-

Although project managers and craft workers have different expectations from a construction project, their goal is common which is to accomplish a project productively. As mentioned before, the organizational structure of a construction project has an important impact on its productivity. Therefore, in both of the studies organizational factor group was identified as the most important factor group affecting productivity (Table 5).

Table5. Ranking of factor groups in both of the studies.

Rank ^a	Rank ^b	Factor Group Name	Median RII ^a	Median RII ^b	Effect level ^a	Effect level ^b
1	1	Organizational	4.09	4.06	ES	VS
2	2	Economic	4.02	3.81	ES	VS
3	4	Socio-psychological	3.54	3.28	ES	VS
4	3	Physical	3.40	3.46	VS	VS

a: from craft worker's perspective

b: from manager's perspective [1]

5. Conclusion

Labor productivity has a big impact on the time and cost performance of a construction project. Therefore, for an effective project management factors affecting labor productivity should be identified. Although in the literature there are many researches related with identifying factors affecting labor productivity, in most of the studies perspectives of craft workers were neglected. In these studies, only participant which had a managing position evaluated the given factors. But in fact craft workers are the one who determines labor productivity. In this aspect, labor productivity perspective of craft workers should also be considered by developing an effective management policy.

In this study, labor productivity perspective of craft workers was identified and compared with project managers' perspective. For this purpose, a questionnaire a previously used questionnaire by Kazaz et al [1] to evaluate construction managers' perspective was applied to craft workers and the results were compared. The results revealed that, craft workers are very sensitive to economic issues. In other words, they are anxious about not to receive a recompense for their work. Therefore economic factors are evaluated as extremely significant. On the other side, in project managers' perspective the organizational structure of a construction project is the most influential factor that affects labor productivity. Finally, although project managers and craft workers have different expectations from a construction project, their common aim is to finish a project productively. Therefore, organizational factor group was evaluated as the most significant group by both project managers and craft workers.

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